

What is claimed is:

1 1. For a semiconductor device that includes a semiconductor die having a circuit
2 side and bulk silicon in an back side opposite the circuit side, a method for detecting a
3 defect at a surface in the die, comprising:
4 locating a first beam splitter for optical manipulation relative to the back side of
5 the semiconductor die;
6 directing light of a known wavelength at the beam splitter, wherein the first beam
7 splitter is adapted to direct a first beam of light into the back side of the semiconductor
8 die which reflects a second beam of light back;
9 redirecting the second beam to a second beam splitter, the second beam splitter
10 generating third and fourth beams of light; and
11 analyzing the third and fourth beams of light, including comparing a relational
12 factor that is a function of the two beams of light with a reference and detecting
13 therefrom a surface defect in the die.

1 2. A method, according to claim 1, further including using the first and second beam
2 splitters to generate different third and fourth beams from a nondefective semiconductor
3 and analyzing the different third and fourth beams of light to develop the reference.

Suba' 1 3. A method, according to claim 2, wherein the back side of the semiconductor die
2 reflects the second beam of light back to the first beam splitter, and wherein the relational
3 factor is a function of a time differential, or intensity, between the first and second beams
4 of light.

1 4. A method, according to claim 3, further including thinning the back side of the die
2 before the steps of claim 1.

1 5. A method, according to claim 4, wherein thinning the back side of the die
2 includes locally thinning a portion of the back side of the die.

1 6. A method, according to claim 4, wherein thinning the back side of the die
2 includes locally thinning a portion of the back side of the die to a thickness of less than
3 about 20 microns.

1 7. A method, according to claim 1, wherein the light of a known wavelength is near
2 infra-red light.

Sub 02 1 8. A method, according to claim 1, wherein the relational factor is a function of a
2 time differential, or intensity, between the first and second beams of light.

1 9. A method, according to claim 1, wherein the back side of the die into which the
2 beam of light is directed has a thickness of at least about 20 microns.

1 10. A system for detecting a defect in a semiconductor device that includes a
2 semiconductor die having a circuit side and bulk silicon in an back side opposite the
3 circuit side, comprising:
4 first beam splitter means for beam splitting and adapted for optical manipulation
5 relative to the back side of the semiconductor die;
6 laser means for directing light of a known wavelength at the first beam splitter
7 means, wherein the first beam splitter means is adapted to direct a first beam of light into
8 the back side of the semiconductor die which reflects a second beam of light;
9 second beam splitter means for generating third and fourth beams of light in
10 response to the second beam being a redirected; and
11 means for analyzing the third and fourth beams of light, including means for
12 comparing a relational factor that is a function of the two beams of light with a reference
13 and detecting therefrom a surface defect in the die.

1 11. A system for detecting a defect in a semiconductor device that includes a
2 semiconductor die having a circuit side and bulk silicon in an back side opposite the
3 circuit side, comprising:
4 a first beam splitter adapted for optical manipulation relative to the back side of
5 the semiconductor die;
6 a laser for directing light of a known wavelength at the first beam splitter, wherein
7 the first beam splitter means is adapted to direct a first beam of light into the back side of
8 the semiconductor die which reflects a second beam of light back;
9 a second beam splitter for generating third and fourth beams of light in response
10 to the second beam being a redirected; and
11 a processor adapted for analyzing the third and fourth beams of light, including
12 comparing a relational factor that is a function of the two beams of light with a reference
13 and detecting therefrom a surface defect in the die.

1 12. A system, according to claim 11, wherein the back side of the semiconductor die
2 reflects the second beam of light back to the first beam splitter.

1 13. A system, according to claim 11, wherein the laser is a YAG laser.

1 14. A system, according to claim 11, further including means for thinning the back
2 side of the die.

1 15. A system, according to claim 11, wherein the laser is a YAG laser, and further
2 including means for thinning the back side of the die.

1 16. A system, according to claim 11, wherein the relational factor is a function of a
2 time differential, or intensity, between the first and second beams of light.